

Claims (as filed on May 28, 2004)

1. A capsule  
5 - having a diameter of less than 100  $\mu\text{m}$ , and  
- an envelope which comprises at least three  
polyelectrolyte layers, with at least one of these  
three polyelectrolyte layers being labeled with at  
least one dye which is covalently linked, at high  
10 concentration, to a sensitive material,  
with the concentration of the dye being so high that  
the dye forms dimers, aggregates or excimers with  
itself, which latter lead to self-quenching of the  
fluorescence or to the formation of a new emission  
15 band.
2. A capsule as claimed in claim 1, characterized in  
that the sensitive material is a material which either  
swells or shrinks, with its volume thereby being  
20 altered, when its environmental conditions change.
3. A capsule as claimed in claim 2, characterized in  
that the environmental conditions are the pH, the salt  
concentration, the temperature, adsorbed components,  
25 enzymes, the concentration of a substance, physical  
parameters, components which affect the solvent or  
which react with the sensitive material, and also  
miscible solvent constituents.
- 30 4. A capsule as claimed in one of claims 1 to 3,  
characterized in that the concentration of the dye  
satisfies the relationship  
mass of sensitive material:mass of dye < 500:1.
- 35 5. A capsule as claimed in one of claims 1 to 4,  
characterized in that the dye-labeled layer has a  
thickness of from 1 nm to 1  $\mu\text{m}$ .
6. A capsule as claimed in one of claims 1 to 5,

characterized in that the polyelectrolyte layer which is labeled with dyes is an organic polyelectrolyte layer which is labeled with dyes.

5 7. A capsule as claimed in one of the preceding claims, characterized in that the dye is fluorescent dyes or emitting nanoparticles.

8. A capsule as claimed in one of the preceding  
10 claims, characterized in that it is hollow and macromolecules are located in its internal space which is delimited by the envelope.

9. A capsule as claimed in one of claims 1 to 7,  
15 characterized in that it has a modified core which possesses sensory or coordinating properties.

10. A capsule as claimed in one of the preceding claims, characterized in that the envelope are  
20 permeable to molecules of up to a given size.

11. A capsule as claimed in one of claims 1 to 7, characterized in that the capsule possesses a solid core which is surrounded by the envelope.  
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12. A capsule as claimed in one of the preceding claims, characterized in that it has an average diameter of less than 10  $\mu\text{m}$ , preferably of less than 1  $\mu\text{m}$ .  
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13. A capsule as claimed in one of the preceding claims, characterized in that it is prepared by the layer-by-layer method.

35 14. A capsule as claimed in one of the preceding claims, characterized in that the capsule is used for labeling or coding industrial products, particles, cells, tissues, organs or organisms of biological

origin.

15. The use of a capsule as claimed in one of the  
preceding claims as a library of reporter particles or  
5 coded color particles for identifying substances and/or  
labeling process.

16. The use of a capsule as claimed in one of the  
preceding claims in medical diagnosis, combinatorial  
10 chemistry, genomics and proteomics, biology and  
biotechnology and industry.